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	First Named Inventor	Hsiao	
	Art Unit	2815	
	Examiner Name	N. Drew Richards	
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PATENT

10/689,298



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of: Hsiao et al.

Serial No.: 10/689,298

Filed: October 20, 2003

Group Art Unit: 2815

Confirmation No.: 4293

Before the Examiner: N. Drew Richards

Title: METHOD AND SYSTEM FOR REDUCING SHORT CHANNEL
MEMORY EFFECTS IN A MEMORY DEVICE BY REDUCTION OF
DRAIN THERMAL CYCLING

REPLY BRIEF PURSUANT TO 37 C.F.R. §41.41

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Dear Sir:

This Reply Brief is being submitted in response to the Examiner's Answer dated January 11, 2006, with a two-month statutory period for reply set to expire on March 13, 2006.

I. EXAMINER'S STATEMENT OF GROUNDS OF REJECTION

The Examiner has repeated the same grounds for rejections as identified in Examiner's previous Office Actions. No new grounds have been raised by Examiner.

II. REPLY TO EXAMINER'S RESPONSE TO ARGUMENT IN EXAMINER'S ANSWER

A. Regarding the Examiner's Response to argument for claim 1

The Examiner maintains that the MDD2 implant in *Chen* anticipates the drain implant in the present invention. However, there are critical flaws in the Examiner's reasoning used against the claim limitations, and the Examiner has not properly interpreted the claim language. The fundamental issue is the interpretation of the claim term "drain implant".

Firstly, the language in claim 1 states (emphasis added):

A method for providing a semiconductor memory device including a substrate and at least one field isolation region, the method comprising the steps of:

(a) providing a plurality of gate stacks above the substrate, each of the plurality of gate stacks including a first edge and a second edge, each of the plurality of gate stacks crossing the at least one field isolation region;

(b) providing a source implant adjacent to the first edge of each of the plurality of gate stacks;

(c) driving the source implant under the first edge of each of the plurality of gate stacks; and

(d) providing a drain implant after step (c), the drain implant being provided in the substrate adjacent to the second edge of each of the plurality of gate stacks.

Claim 1 refers to a semiconductor memory device comprising gate stacks that include a first edge and a second edge. The structure and arrangement of elements in a gate stack is disclosed in the application and is well-known in the art. In step (b), the source implant is provided adjacent to the first edge, which provides for forming the source terminal of the memory device. In step (d), the drain implant provides for forming the drain terminal of the memory device. *See* Figures 3 and 4.

Each of steps (b) and (d) refer to the first edge and second edge, respectively, of a gate stack. In particular, step (d) does not make any mention of a source implant or providing an implant along the first edge of the gate stack. Yet, this is precisely what the Examiner maintains that step (d) in claim 1 may be interpreted to include. Appellants respectfully traverse. Furthermore, the Examiner interprets the claims in a manner inconsistent with the claim language and the specification, and in a way inoperable for solving the problem that Appellants have identified in the Background Section, namely reducing short channel memory effects. See Background Section, p. 5, line 23 to p. 6, line 10. The Examiner also ignores claim language that refers to a first edge and a second edge of a gate stack in a semiconductor memory device, which provides a clear distinction between the source and the drain terminals. "The words of the claim must be given their plain meaning." See M.P.E.P. §2111.01, emphasis added. In this case, the Examiner's interpretation of "drain implant" is broader than the plain meaning, would allow—especially in view of the claim language referring to the first and second edges of the gate stack. Appellants respectfully assert that the term "drain implant" is supported by the claim language and specification to mean an implant performed exclusively on the drain.

The Examiner states, in ostensible support of an overly broad interpretation of "drain implant," that:

Note that in the prior art the terms for the implantations are loosely defined and used. For instance, the implant into only the source region of figure 6C [in Chen] is referred to as a MDD implant [in Chen] even though it clearly is only applied to the source region. The usage of the terminology in the prior art lends further support to the Examiner's broadest reasonable interpretation of the term "drain implant." See Examiner's Answer from 01/11/2006, p. 11, line 22 to p. 12, line 4.

Based on an unreasonably broad interpretation of terms, that by the Examiner's own admission are not precisely defined in the cited prior art, the Examiner insists that the claim language broadly reads upon the same prior art, absent any guidance or support from Appellant's claim language or specification. Appellants also note that *Chen* does not address the problem of short channel memory effects with respect to drain implants, and that the MDD2 implant in *Chen* would necessarily raise the dopant concentration at the source, which *Chen* himself admits would increase detrimental short-

channel effects. *Chen*, col 8, lines 42-44. Appellants respectfully assert that the MDD2 implant in *Chen* is performed for the source and the drain, and therefore, cannot be accurately interpreted as a "drain implant being provided in the substrate adjacent to the second edge" of a gate stack, as in claim 1. In this instance, the imprecise usage of the terminology in the prior art does not lend support to the Examiner's unreasonably broad interpretation, but in fact, precludes the Examiner from relying upon such inaccurate definitions; the Examiner must primarily interpret the claim language based on the plain meaning. Since neither the plain meaning nor the specification nor the drawings, *see* Figures 3 and 4, provide support for a "drain implant" being applied at the source and at the drain, the Examiner's unreasonably broad interpretation of this claim term should not predominately be guided by extrinsic evidence (which is itself unclear and misleading with respect to the plain meaning of terms). The Examiner's overly broad interpretation of claim 1, to include limitations that are neither stated in the claim language nor are supported by Appellants' specification, is therefore in error.

Upon correctly interpreting "drain implant" to mean a drain implant (and not a source and drain implant), guided foremost by a reasonable interpretation, based on the plain meaning of terms of the claim language, and the specification, the Examiner's assertion that "*Chen* does have a drain implant performed separately from the source implant," *see* Examiner's Answer from 01/11/2006, p. 12, line 5, cannot stand. As a result of the foregoing, Appellants respectfully assert that the rejection of claim 1 is in error.

B. Regarding the Examiner's Response to argument for claim 4

At issue is whether or not element 720 in *Chen* may be interpreted as disclosing a first and second spacer along the first and second edges of a gate stack. The Examiner maintains that the oxidation sealing layer 720 of silicon oxide, disposed over the entire array, is equivalent to the claim limitations of claim 4, which state:

The method of claim 1 further comprising the step of:

- (e) providing a first spacer and a second spacer for each of the plurality of gate stacks, the first spacer being disposed along the first edge of each of

the plurality of gate stacks, the second spacer being disposed along the second edge of each of the plurality of gate stacks.

Claim 4 refers to a first spacer disposed along a first edge and a second spacer disposed along a second edge of a gate stack. The specification states that the spacers are provided in step 162, which "includes depositing insulating layers and etching the layers to form the spacers." In contrast, *Chen* discloses a sealing layer 720 of silicon oxide as a final oxidation step in forming the device. *Chen*, col. 7, lines 9-12, 23-25. There is no mention in *Chen* that layer 720 is etched to form the spacers. Therefore, the layer 720 in *Chen* does not meet the description of a "spacer" as in claim 4. By interpreting a sealing oxide layer that does not require etching to form the spacers, the Examiner is applying an overly broad interpretation of a "spacer" that does not find support in Appellant's claims in the specification. Appellants reiterate the arguments presented in this paper in support of claim 1 regarding the Examiner's requirement to use the plain meaning of claim terms, in accordance with the specification, as the primary guide to interpreting the claims. As a result of the foregoing, the Examiner's overly broad interpretation of a "spacer" is clearly in error, because layer 720 in *Chen* does not anticipate a "spacer."

C. Regarding the Examiner's Response to argument for claim 5

At issue regarding claim 5 is whether or not the Self-Aligned Source (SAS) etch in *Chen*, which the Examiner admits is disclosed as being performed before implantation, anticipates this claim. Claim 5 depends from claim 4, which in turn depends on claim 1. The spacers in claim 4 are disclosed in the specification as being provided after the drain implant. In fact, the drain implant could not be provided after the spacers are provided, as the spacers would inoperably obstruct an implant (source and drain) whenever present. Therefore, claim 5 as written is performed after implantation, since it further limits an instance of claim 4. As a result, the Examiner's interpretation that claim 5 does not require the added step be performed at any particular point during the process is in error, and hence, *Chen* does not anticipate this claim.

D. Regarding the Examiner's Response to argument for claims 3, 7, 8, 17, and 19

The Examiner's response is in error regarding claims 3, 7, 8, 17, and 19 for at least the reasons provided in this paper in support of claim 1.

E. Regarding the Examiner's Response to argument for claims 20 and 21

The Examiner's response is in error regarding claims 20 and 21 for at least the reasons provided in this paper in support of claim 19.

F. Regarding the Examiner's Response to argument for claims 9, 24, 25, 6, 26, 22 and 23

Inasmuch as the Examiner's response relies upon the subject matter in independent claims 1 and 19, the response is in error regarding claims 9, 24, 25, 6, 26, 22 and 23 for at least the reasons provided in this paper in support of claims 1 and 19.

With respect to the motivation to combine, Appellants reiterate the detailed arguments presented in sections B.1., C.1., and D.1. of the Appeal Brief. Appellants respectfully disagree with the Examiner's stated motivation to combine *Chen* with *Gardner* and with *Miyata*, which is ultimately based, at least in part, on an unreasonably broad interpretation of "drain implant" for at least the reasons presented previously in this paper. Appellants also respectfully disagree with the Examiner's stated motivation to combine *Chen* with *Shah* because the references are not analogous art.

II. CONCLUSION

For the reasons stated in Appellant's Appeal Brief and noted above, Appellants respectfully assert that the rejections of claims 1, 3-9 and 17-26 are in error. Appellants respectfully request reversal of the rejections and allowance of claims 1, 3-9 and 17-26.

Respectfully submitted,

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Attorneys for Appellants

Date: March 13, 2006

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CERTIFICATION UNDER 37 C.F.R. § 1.8

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Michael P. Adams
Signature